Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 28, 2003

LDC Report Date: June 13, 2003

Matrix: Water

Parameters: N-Nitrosodimethylamine

Validation Level: EPA Level III

Laboratory: Maxxam Analytics, Inc.

Sample Delivery Group (SDG): 03-2937

Sample Identification

MW-17-4

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis, as applicable. The analyses were per SOP TO.1021.08 for N-Nitrosodimethylamine.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A table summarizing all data qualification is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 25.0% for all compounds.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No N-Nitrosodimethylamine contaminants were found in the method blanks.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags have been summarized at the end of the report.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL

N-Nitrosodimethylamine - Data Qualification Summary - SDG 03-2937

No Sample Data Qualified in this SDG

NASA JPL

N-Nitrosodimethylamine - Laboratory Blank Data Qualification Summary - SDG 03-2937

No Sample Data Qualified in this SDG

MW-17-4

Lab Name	Maxxa	m Analytics Inc.				
Matrix (soll/water):	water				Lab Sample ID: Project Name:	A315096-A01352 JPL
Sample wt/vol:	1000	(g/mL)	mL		Lab File ID:	KR23490012
Level (low/med)	low				Date Received:	May 2, 2003
% Moisture	Not applicable	Decanted (Y/N):	N		Date Extracted:	May 5, 2003
·					Lab Batch:	472719
Concentrated Extract Volume	1000	(uL)			Date Analyzed:	May 14, 2003
					Calib. Ref.;	20030513
Injection Volume	2	(uL)			Time Analyzed:	11:55:48
Acid Wash Cleanup (Y/N):	Ν	 pH	Not analyzed		Dilution Factor.	. 1
CAS No.	Compound	Conc.	Qualifier	EDL (vall)	RL (val)	
62-75-9	NDMA	(ug/L) 0,00200	······································	(ug/L) 0.000370	(ug/L) 0.00200	
	Surrogate	Recovery		ce Criteria	1	
000	D6-NDMA	(%)		<u>%) </u>	-	

SDG # Labora METH The sa	t: 03-2937 atory: <u>Maxxam Analytics, Inc.</u> OD: HRGC/HRMS NDMA (Method # T <i>t</i>	PLETENESS WORKSHEET Level III Page:(of Reviewer: 2nd Reviewer: Solution of the control of th	
	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 4/28/03
II.	HRGC/HRMS Instrument performance check	A	/ /
III.	Initial calibration	4	70RSD = 2570
IV.	Routine calibration	4	70 D = 25/10
V.	Blanks	A	

Note:

VII.

VIII.

IX.

X.

XI.

XII.

XIII.

XIV.

XV.

Field duplicates

Field blanks

A = Acceptable N = Not provided/applicable

Matrix spike/Matrix spike duplicates

Target compound identifications

Compound quantitation and CRQLs

Regional quality assurance and quality control

Laboratory control samples

Internal standards

System performance

Overall assessment of data

SW = See worksheet

ND = No compounds detected

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Ν

Ν

N

Ν

N

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank
EB = Equipment blank

Validated Samples:

1	MW-17-4 W	11	21	31
2	47-2719MB	12	22	32
3		13	23	33
4		14	24	34
5		15	25	35
6		16	26	36
7		17	27	37
8		18	28	38
9		19	29	39
10		20	30	40

Notes:			
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

April 29, 2003

LDC Report Date:

June 13, 2003

Matrix:

Water

Parameters:

N-Nitrosodimethylamine

Validation Level:

EPA Level III

Laboratory:

Maxxam Analytics, Inc.

Sample Delivery Group (SDG): 03-2966

Sample Identification

MW-24-1

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis, as applicable. The analyses were per SOP TO.1021.08 for N-Nitrosodimethylamine.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A table summarizing all data qualification is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
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- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 25.0% for all compounds.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No N-Nitrosodimethylamine contaminants were found in the method blanks.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags have been summarized at the end of the report.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL N-Nitrosodimethylamine - Data Qualification Summary - SDG 03-2966

No Sample Data Qualified in this SDG

NASA JPL N-Nitrosodimethylamine - Laboratory Blank Data Qualification Summary - SDG 03-2966

No Sample Data Qualified in this SDG

MW-24-1

Lab Name	Maxxam Analytics Inc.	·		
Matrix (soli/water):	water		Lab Sample ID:	A315100-A01366
	1000 (g/mL)	mL	Project Name:	JPL KR23490013
Sample wt/vol:	(9/112)		_	110.000
Level (low/med)	low		Date Received:	May 2, 2003
% Moisture	Not applicable Decanted (Y/N): <u> </u>	Date Extracted:	May 5, 2003
	1000 (uL)		Lab Batch: Date Analyzed:	472719 May 14, 2003
Concentrated Extract Volume	1000 (dc)		Callb. Ref.:	20030513
Injection Volume	(uL)		Time Analyzed:	12:14:45
	N pH	Not analyzed	Ollution Factor:	1
Acid Wash Cleanup (Y/N):	NP⊓	NOT BITATIVES		

CAS No.	Compound	Conc. (ug/L)	Qualifier	EDL (ug/L)	RL (ug/L)
62-75-9	NDMA	0.00200	U	0.000370	0.00200
	Surrogate	Recovery (%)	Acceptance Criteria (%)		
000	D6-NDMA	27	10	0-85	

1/19/10

LDC #: 10414J87 SDG #: 03-2966 Laboratory: Maxxam Analytics, METHOD: HRGC/HRMS NDM		Date: 6/n/o 3 Page: 1 of 1 Reviewer: 2nd Reviewer:
	A (Method + (V. 10 - 21 . 0 - 3) reviewed for each of the following validation areas. Validation	findings are noted in attached

	Validation Area		Comments
i.	Technical holding times	4	Sampling dates: 4/29/03
11.	HRGC/HRMS Instrument performance check	A	/
111.	Initial calibration	A	70850 = xx70
IV.	Routine calibration	1	70D < >570
V.	Blanks	Ā	1
VI.	Matrix spike/Matrix spike duplicates	И	diend stirled
VII.	Laboratory control samples	₩	LCSD
VIII,	Regional quality assurance and quality control	N	
IX.	Internal standards	Ø	
Х.	Target compound identifications	N	
ΧI.	Compound quantitation and CRQLs	N	
XII.	System performance	N	
XIII.	Overall assessment of data	1	
XIV.	Field duplicates	N	
XV.	Field blanks	i,	

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet

ND = No compounds detected R = Rinsate FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

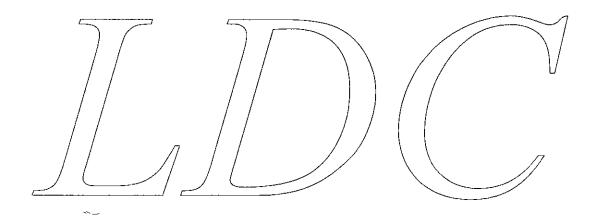
Validated Samples:

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1_	MW-24-1 W	11	21	31_
2	472T19MB	12	22	32
3		13	23	33
4		14	24	34
5		15	25	35
6		16	26	36
7		17	27	37
8		18	28	38
9		19	29	39
10		20	30	40

Notes:			
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NASA JPL Data Validation Reports LDC# 10414

Metals



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 17, 2003

LDC Report Date: June 17, 2003

Matrix: Water

Parameters: Metals

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2767

Sample Identification

EB-1-4/17/03

MW-21-1

MW-21-2

MW-21-3

MW-21-4

MW-21-5

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
4/23/03 :	CCV (15:33)	Arsenic	110.2 (90-110)	EB-1-4/17/03 MW-21-1 MW-21-2 MW-21-3 MW-21-4	J (all detects)	P
4/23/03	CCV (16:50)	Arsenic	111.0 (90-110)	MW-21-5	J (all detects)	Р

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Magnesium Potassium Sodium	158 ug/L 62.6 ug/L 131 ug/L 403 ug/L	All samples in SDG 03-2767
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	238.28 ug/L 44.45 ug/L 81.45 ug/L 156.73 ug/L 752.30 ug/L	All samples in SDG 03-2767

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-1-4/17/03	Calcium Iron Magnesium Potassium Sodium	278 ug/L 19.4 ug/L 38.4 ug/L 152 ug/L 720 ug/L	278U ug/L 19.4U ug/L 38.4U ug/L 152U ug/L 720U ug/L
MW-21-1	Iron	150 ug/L	150U ug/L
MW-21-2	Iron	146 ug/L	146U ug/L
MW-21-3	Iron	40.5 ug/L	40,5U ug/L
MW-21-4	Iron	16.1 ug/L	16.1U ug/L
MW-21-5	Iron	210 ug/L	210U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

Vill. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

XIV. Field Blanks

Sample EB-1-4/17/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-1-4/17/03	Calcium	278
	Iron	19.4
	Magnesium	38.4
li e	Potassium	152
	Sodium	720

NASA JPL Metals - Data Qualification Summary - SDG 03-2767

SDG	Sample	Analyte	Flag	A or P	Reason
03-2767	EB-1-4/17/03 MW-21-1 MW-21-2 MW-21-3 MW-21-4 MW-21-5	Arsenic	J (all detects)	P	Calibration verification (%R)

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 03-2767

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2767	EB-1-4/17/03	Calcium Iron Magnesium Potassium Sodium	278U ug/L 19.4U ug/L 38.4U ug/L 152U ug/L 720U ug/L	А
03-2767	MW-21-1	Iron	150U ug/L	Α
03-2767	MW-21-2	Iron	146U ug/L	Α
03-2767	MW-21-3	Iron	40.5U ug/L	Α
03-2767	MW-21-4	Iron	16.1U ug/L	A
03-2767	MW-21-5	Iron	210U ug/L,	Α

Applied P & Ch Laboratory

Metal Analysis Results

Client Name: GEOFON, Inc.

JPLProject ID:

Project No:

04-4428.10 32767

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Service ID:

Lab Sample ID: 03-2767-1 Sample Matrix Water

Moisture %:

Sample ID:

EB-1-4/17/03 ımple

	Sample	Туре:	Field	Sa
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Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F	•	03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	278 U		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	19.4	В	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	$\mu { m g}/{ m L}$	100	38.4	В	P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	152	В	P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	720 🕹	В	P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

U - Not Detected or less than IDL C Qualifier:

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

M Qualifier: P - ICP

Q Qualifier:

A - FLAA

F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

CV - Cold Vapor

/6/18/cm

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:

GEOFON, Inc.

Project No:

04-4428.10

Collection Date: 04/17/2003

Service ID:

32767

Collected by:

Received Date: 04/17/2003

Sample ID:

Project ID:

MW-21-1

JPL

Lab Sample ID: 03-2767-2

Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	128000		Р		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	150	И	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	40300		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g}}/\mathrm{L}$	400	2180		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	30800		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

N - Spike recovery out of control Q Qualifier:

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Applied P & Ch Laboratory Metal Analysis Results

GEOFON, Inc. Client Name:

Project ID: JPL Project No: Service ID:

04-4428.10

32767

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Sample ID:

Lab Sample ID: 03-2767-3 Sample Matrix Water

Moisture %:

MW-21-2 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	122000		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	146	U	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g/L}}$	100	41800		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	$\mu \mathrm{g}/\mathrm{L}$	400	3370		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	67300		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

N - Spike recovery out of control Q Qualifier:

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

76/16/00

Applied P & Ch Laboratory Metal Analysis Results

Service ID:

Client Name: GEOFON, Inc.

JPL

MW-21-3

Project No: 04-4428.10

32767

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Sample ID:

Project ID:

Lab Sample ID: 03-2767-4

Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	$_{\mu \mathrm{g/L}}$	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	123000		Р		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	40.5	ИB	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g}}/\mathrm{L}$	100	40300		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g/L}}$	400	3130		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	39800		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

U - Not Detected or less than IDL Ċ Qualifier:

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier:

P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Service ID:

Client Name: GEOFON, Inc.

Project ID: JPL

Project No: 04-4428.10

Lab Sample ID: 03-2767-5

32767

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Sample ID: MW-21-4
Sample Type: Field Sample

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	2.2	В	F	J	03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	μg/L	200	77200		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	16.1 V	В	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	$\mu { m g}/{ m L}$	100	23900		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	2130		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g}/\mathrm{L}$	2000	26200		P		03M1353M	04/22/03	04/22/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

M Qualifier: P - ICP

Q Qualifier:

A - FLAA F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

CV - Cold Vapor

10/18/00

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:

GEOFON, Inc.

Project ID:

Project No: Service ID:

04-4428.10

32767

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Sample ID:

JPL

Sample Type: Field Sample

MW-21-5

Lab Sample ID: 03-2767-6

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	μg/L	200	83600		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g/L}}$	50	210	N	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}{ m g}/{ m L}$	100	30800		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	2570		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	32500		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

C Qualifier: Q Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

M Qualifier: P - ICP A - FLAA

F - GFAA

* - Duplicate analysis out of control E - Serial dilution difference out of control

CV - Cold Vapor

SDG	#: <u>10414A4</u> #: <u>03-2767</u> ratory: <u>Applied P & Ch La</u>			PLETEN Level III	IESS WORK	SHEET	Date: 6/16/ Page: of 1 Reviewer: 48 2nd Reviewer:
MET	HOD: Metals (EPA Metho	od 200.7 & 200.9)				Zild Reviewer.
The s /alida	samples listed below were ation findings worksheets	e reviewed for ea	ch of the f	ollowing v	/alidation areas	. Validation findin	gs are noted in attached
	Validation	Area				Comments	
i.	Technical holding times		A	Sampling	dates: 4/11/02		
II.	Calibration		5W	1 1	17.71		
≡.	Bianks		5W		_	•	
IV.	ICP Interference Check Sar	nple (ICS) Analysis	A				
V.	Matrix Spike Analysis		A	1 145	/msp/vup	from 3867 03	-2809 for 13
VI.	Duplicate Sample Analysis		A	1		(
VII.	Laboratory Control Samples	(LCS)	A	Los/1	-CSD		
VIII	Internal Standard (ICP-MS)		N	Not	Hobert		
IX.	Furnace Atomic Absorption	QC	A	MSA	was not	pertund.	
Χ.	ICP Serial Dilution		N	Not	required	t i	
XI.	Sample Result Verification		N		ð		
XII.	Overall Assessment of Data	<u>L</u>	N				
XIII.	Field Duplicates		H				
XIV.	Field Blanks		<i>Ś</i> ₩	EB=)		
lote: /alida	A = Acceptable N = Not provided/applicable SW = See worksheet led Samples:	R = Rin	o compound isate eld blank	s detected	D = Duplio TB = Trip EB = Equ		
1	EB-1-4/17/03	11		21		31	
2	MW-21-1	12		22		32	
3	MW-21-2	13		23		33	
4	MW-21-3	14		24	<u> </u>	34	
5	MW-21-4	15		25		35	
6	MW-21-5	16		26		36	
7	PB	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30	<u> </u>	40	

Notes:_

LDC #:<u>|0414&4</u> SDG #:<u>03-~71</u>7

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:	of
Reviewer:_	110
2nd reviewer:_	1/

All circled elements are applicable to each sample.

		Target Analyte List (TAL)
Sample ID	Matrix	
1-16	AD.	Al, Sb, As Ba, Be, Cd, Ca, Cr, Co, Cu, Ppb, Mg Mn, Hg, Ni, K, Se, Ag, Na Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
-		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	· .	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP Trace		Al, Sb, As, Ba, Be, Cd, Ca) Cr, Co, Cu, Fe) Pb, Mg, Mg, Hg, Ni, K, Se, Ag, Na) Π, V, Zn, Mo, B, Si, CN',
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',

Comments:	Mercury by CVAA if performed	

(0414My

VALIDATION FINDINGS WORKSHEET Calibration

Reviewer: 2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?

Were all initial and continuing calibration verification percent recoverles (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)?

LEVEL IV ONLY:

Y N M/A

Y N N/A

Are

Was a midrange cyanide standard distilled? Are all correlation coefficients ≥0.995?

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

SDG #: 03-2-067 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Blank concentration units, unless otherwise noted: 47/8 63-2067 14/4/ho LDC #:

VALIDATION FINDINGS WORKSHEET Prep Blank/ICB/CCB Findings

Page: Reviewer:_ 2nd Reviewer:

Associated Samples:

					Blank identification					
	ССВ1	CCB2	CCB3	PB()	ICB	CCB1	CCB2	CCB3	PB (Analyte
										A
										QS
							!			As
										Ва
								:		Be
										ව
]										ర్
										ర
										క
										5
	44,45									e.
										Pb
\perp										Mg
										Mn
										Hg
										Z
	156.73									×
										Se
										Αg
										Na
			i							F
										>
								•	,	Zn
										В
										Mo
										Š

The highest concentration found in the Prep Blank and ICB/CCB for each analyte is circled on this worksheet and transferred to the PB/ICB/CCB Qualified Samples worksheet.

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VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied:
A Associated Samples:

jo 	Z Z	4	
Page:	Reviewer:	2nd Reviewer:	

		ΑI	S	As	Ba	å	8	g	ច់	გ	8	Ð	8	Mg	Mn	Ŧ	Z	×	88	Ag	ş	F	>	۲z	В	Νο	ď
																	,										
ŀ											-																
																								•			
																								_			
tification																					_						_
Sample identification	9											017															
S	\mathcal{P}											(>9)				·											
	4											40,5															
	~											971			i i						ì						
	٨											8															
								24.8				14.4		78.4				7			22						
	Blank Action Limit							11611				37,55		409,25	3			183.65			3161						
	Maximum ICB/CCB* (ug/L)							238.28				44.45		24.18				15h.13			472,30						
	Maxlmum PB*	L						128						4.54				(5)	-		403						
	Maximum PB" (ma/Ka)																										
	Analyte	Ā	8	As	Ba	8	<u>ප</u>	్రీ	ŏ	පි	ुं	EL.	Pb	Ma	, M	£	, ≥	7	e,	Ag	Z Z	E	>	Zn	60	Ma	ي ري

Samples with analyte concentrations within five lines the esociated ICB, CCB or PB concentration are listed above with were qualified as not detected, "U".

Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #:	1041484
SDG #:	03-2767

VALIDATION FINDINGS WORKSHEET Field Blanks

<u>ot/_</u>
MH
A

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

6	711 11/4	***
<u> </u>	<u>r IN N/A</u>	Were field blanks identified in this SDG?
7	N N/A	Were target analytes detected in the field blanks?
- >		mage and selected in the mad blanks?

Sample: ____ Field Blank / Trip Blank / Rinsate / Other ___ EB ___(circle one)

Analyte	Concentration Units (U)()
	218
Te	19.4
- Mg	58-4
K	152
Na Na	720

Sample: _____ Field Blank / Trip Blank / Rinsate / Other____ (circle one)

Analyte	Concentration Units ()

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 21, 2003

LDC Report Date: June 17, 2003

Matrix: Water

Parameters: Metals

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2809

Sample Identification

DUPE-1-2Q03

EB-2-4/21/03

MW-4-1

MW-4-2

MW-4-3

MW-4-4

MW-4-5

SOURCE-2Q03

MW-4-2MS

MW-4-2MSD

MW-4-2DUP

Introduction

This data review covers 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
4/23/03	CCV (14:17)	Arsenic	110.2 (90-110)	EB-2-4/21/03 MW-4-1 MW-4-3 MW-4-4 MW-4-5 SOURCE-2Q03	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Potassium	49.3 ug/L	All samples in SDG 03-2809
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	241.36 ug/L 86.02 ug/L 99.01 ug/L 145.74 ug/L 714.37 ug/L	All samples in SDG 03-2809

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
DUPE-1-2Q03	lron	231 ug/L	231U ug/L
EB-2-4/21/03	Potassium Sodium	80.7 ug/L 398 ug/L	80.7U ug/L 398U ug/L
MW-4-1	Iron	274 ug/L	274U ug/L
MW-4-4	Iron	243 ug/L	243U ug/L
SOURCE-2Q03	Potassium Sodium	66.7 ug/L 341 ug/L	66.7U ug/L 341U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-4-2L	Potassium	16.3 (≤10)	All samples in SDG 03-2809	J (all detects)	Α

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

Samples DUPE-1-2Q03 and MW-4-4 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentrat	lon (ug/L)	
Analyte	DUPE-1-2Q03	MW-4-4	RPD
Calcium	24500	24500	0
Iron	231	243	5
Magnesium	11900	11800	1
Potassium	1930	1920	1
Sodium	37500	37000	1

XIV. Field Blanks

Sample EB-2-4/21/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-2-4/21/03	Potassium Sodium	80.7 398

Sample SOURCE-2Q03 was identified as a source blank. No metal contaminants were found in this blank with the following exceptions:

Source Blank ID	Analyte	Concentration (ug/L)
SOURCE-2Q03	Potassium Sodium	66.7 341

NASA JPL Metals - Data Qualification Summary - SDG 03-2809

SDG	Sample	Analyte	Flag	A or P	Reason
03-2809	EB-2-4/21/03 MW-4-1 MW-4-3 MW-4-4 MW-4-5 SOURCE-2Q03	Arsenic	J (all detects)	Р	Calibration verification (%R)
03-2809	DUPE-1-2Q03 EB-2-4/21/03 MW-4-1 MW-4-2 MW-4-3 MW-4-4 MW-4-5 SOURCE-2Q03	Potassium	J (all detects)	A	ICP serial dilution (%D)

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 03-2809

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2809	DUPE-1-2Q03	Iron	231U ug/L	А
03-2809	EB-2-4/21/03	Potassium Sodium	80.7U ug/L 398U ug/L	A
03-2809	MW-4-1	Iron	274U ug/L	А
03-2809	MW-4-4	Iron	243U ug/L	А
03-2809	SOURCE-2Q03	Potassium Sodium	66.7U ug/L 341U ug/L	А

Client Name:

GEOFON, Inc.

DUPE-1-2Q03

JPL

Project No:

04-4428.10

Collection Date: 04/21/2003

Service ID:

32809

Collected by:

Received Date: 04/21/2003

Sample ID:

Project ID:

Lab Sample ID: 03-2809-1

Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	υ	F		03M1360E	04/23/03	04/23/03	1	200.9
ÇALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	24500		P		03M1359M	04/23/03	04/23/03	· 1	200.7
IRON	7439-89-6	$_{\mu}{ m g}/{ m L}$	50	231	Ħ	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	11900		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	1930	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g}/\mathrm{L}$	2000	37500		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

P - ICP M Qualifier:

A - FLAA

F - GFAA

Client Name: GEOFON, Inc. Project No:

04-4428.10

Collection Date: 04/21/2003

04/21/2003

Project ID:

JPL

Service ID:

32809

Collected by:

Sample ID:

Lab Sample ID: 03-2809-2

Received Date:

Sample Matrix Water

Moisture %:

Sample Type: Field Sample

EB-2-4/21/03

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}{ m g/L}$	200	< 200	U	P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g/L}}$	50	< 50	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	< 100	U	P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	80.7 UJ	В	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$_{\mu \mathrm{g}}/\mathrm{L}$	2000	398 V	В	P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier:

P - ICP

A - FLAA

F - GFAA

Client Name:

GEOFON, Inc.

Project No:

04-4428.10

Collection Date: 04/21/2003

Collected by:

04/21/2003

Service ID:

32809

Received Date:

Sample ID:

Project ID:

Lab Sample ID: 03-2809-3 Sample Matrix Water

Moisture %:

Sample Type: Field Sample

MW-4-1

	_											
Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	μg/L	200	54200		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	$\mu \mathrm{g/L}$	50	274	И	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	$\mu g/L$	100	17700		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	μg/L	400	2510	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	19100		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

U - Not Detected or less than IDL C Qualifier:

N - Spike recovery out of control Q Qualifier:

W - Post digestion spike for GFAA out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Client Name:

GEOFON, Inc.

Project ID:

Project No:

04-4428.10

Collection Date: 04/21/2003

Collected by:

Service ID:

32809

Received Date:

04/21/2003

Sample ID:

Lab Sample ID: 03-2809-4

Sample Matrix Water

Moisture %:

MW-4-2 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	M,	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	g/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	μg/L	200	115000		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	μg/L	50	592		P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	μg/L	100	39300		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	μg/L	400	2990	ſ	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	μg/L	2000	32500		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

C Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control Q Qualifier:

W - Post digestion spike for GFAA out of control

M Qualifier:

P - ICP

A - FLAA

F - GFAA

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No:

04-4428.10

Collection Date: 04/21/2003

Service ID:

32809

Collected by:

Received Date: 04/21/2003

Sample ID:

Sample Type: Field Sample

MW-4-3

Lab Sample ID: 03-2809-5 Sample Matrix

Moisture %:

Element Name	CAS No	Unit	RL	Result	C	M	0.	Batch	D-Date	A-Date	DF	Method
	OAB NO	<u> </u>										
ARSENIC	7440-38-2	$_{\mu \mathrm{g}}/\mathrm{L}$	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	38200		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L^{}}$	50	6410		P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g/L}}$	100	16100		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	2320	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$_{\mu \mathrm{g/L}}$	2000	32700		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier:

M Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

A - FLAA P - ICP

F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Client Name: Project ID:

GEOFON, Inc.

JPL

Project No:

04-4428.10

Collection Date: 04/21/2003

Collected by:

04/21/2003

Service ID:

32809

Received Date:

Sample ID:

MW-4-4

Lab Sample ID: 03-2809-6 Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	υ	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	24500		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	μg/L	50	243	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}{ m g}/{ m L}$	100	11800	_	P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g}}/\mathrm{L}$	400	1920	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$_{\mu \mathrm{g}}/\mathrm{L}$	2000	37000		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

C Qualifier: Q Qualifier:

U - Not Detected or less than IDL N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

P - ICP M Qualifier:

A - FLAA

F - GFAA

Applied P & Ch Laboratory

Metal Analysis Results

GEOFON, Inc. Client Name:

Project ID: JPL Project No:

04 - 4428.10

Collection Date: 04/21/2003

32809 Collected by: Service ID:

04/21/2003 Received Date:

Sample Matrix Water

Lab Sample ID: 03-2809-7

Moisture %:

MW-4-5 Sample ID: Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	 μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}{ m g/L}$	200	16400		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	$\mu { m g}/{ m L}$	50	1280		P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	μg/L	100	11200		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	μg/L	400	1930	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$\mu { m g/L}$	2000	37000		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

F - GFAA

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier:

M Qualifier: P - ICP

U - Not Detected or less than IDL

N - Spike recovery out of control

A - FLAA

W - Post digestion spike for GFAA out of control

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control E - Serial dilution difference out of control

Client Name: GEOFON, Inc.

Project No:

04-4428.10

Collection Date: 04/21/2003

04/21/2003

Project ID:

JPL

Service ID:

32809

Collected by:

Sample ID:

Lab Sample ID: 03-2809-8 Sample Matrix Water

Received Date:

Moisture %:

SOURCE-2Q03

Sample Type: Field Sample

		_										
Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	$_{\mu\mathrm{g/L}}$	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g}/\mathrm{L}}$	200	< 200	U	P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	< 50	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g}}/\mathrm{L}$	100	< 100	U	P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	66.7 UJ	В	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	$_{\mu \mathrm{g/L}}$	2000	341 U	В	P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

* - Duplicate analysis out of control

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier:

A - FLAA

F - GFAA

CV - Cold Vapor

C/18/00

LDC #: 10414B4 V	ALIDATION COMPLETENESS WORKSHEET	Date: <u>-6 / /6/</u> ->}
SDG #: 03-2809	Level III	Page: <u>/</u> of_ <u>)</u>
Laboratory: Applied P & Ch Laboratory	<u>atory</u>	Reviewer:
METHOD: Metals (EPA Method 2	00.7 & 200.9)	2nd Reviewer:

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
<u>ı.</u>	Technical holding times	A	Sampling dates: 4/2/03
11.	Calibration	Ŵ	, , , ,
111.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	2 645 Auso /on
VI.	Duplicate Sample Analysis		
VII.	Laboratory Control Samples (LCS)	X	Les/Lesp
VIII.	Internal Standard (ICP-MS)	į.	, ,
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	5W	' '
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	5W	(1, 6)
XIV.	Field Blanks	5W	BB=2, 4B=8

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet

ND = No compounds detected R = Rinsate

FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

_	M					
1	DUPE-1-2Q03	11	MW-4-2- Dup	21	31	
2	EB-2-4/21/03	12	PBW	22	32	
3	MW-4-1	13		23	33	
4_	MW-4-2	14		24	34	
5	MW-4-3	15		25	35	
6	MW-4-4	16		26	36	
7	MW-4-5	17		27	37	
8	SOURCE-2Q03	18		28	38	
9	MW-4-2MS	19		29	39	
10	MW-4-2MSD	20		30	40	

Notes:	 	

LDC #: 1041484 SDG #: 03-2809

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: of Reviewer: Mb 2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
-8	40_	Al, Sb, (S) Ba, Be, Cd, (Ca) Cr, Co, Cu, (Fe) Pb, (vg) Mn, Hg, Ni, (K) Se, Ag, (va) TI, V, Zn, Mo, B, Si, CN;
9-11		Al, Sb As, Ba, Be, Cd Ca, Cr, Co, Cu, Fe) Pb, Mg, Mn, Hg, Ni, K, Se, Ag, (Na, TI, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Π, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	·	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	,	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	·()-	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Π, V, Zn, Mo, B, Si, CN ⁻ ,
	——————————————————————————————————————	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN',
	 il-	Al. Sb. As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Τί, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	(Analysis Method
CP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
CP Trace	 -	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na Ti, V, Zn, Mo, B, Si, CN,
CP-MS	i	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
GFAA		Al, Sb, (As) Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
41 (7/7		at the first and and and and and and any first and made and an analysis and an analysis and an analysis and any

Comments: Mercury by CVAA if performed

SDG #: (041484

VALIDATION FINDINGS WORKSHEET Calibration

Reviewer:_ 2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions enswered "N". Not applicable questions are identified as "N/A".

Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)?

LEVEL-IN ONLY:

Was a midrange cyanide standard distilled? Y N N/A

Y N N/A

Are all correlation coefficients ≥0.895? Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

Qualification of Data	Jun	/									
Associated Samples	2,3.5-8	,									
%R	(011-06) 2011	,									
Analyte	fr.										
Calibration ID	(4141) 100										
# Date	1 4/2/03										

SDG #: | o4 | 4 | 8 | PB/ICB/ICE QUALIFIED SAMPLES SDG #: 03 -2809 | PB/ICB/ICE QUALIFIED SAMPLES METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: Associated Samples:

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Page:	Reviewer:	2nd Reviewer:	

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																										_	
ŀ		-				_	-	_																			
-		-						-									-										
Meation			-																								
Sample Identification																											_
S	&			:											:	•		66.7	1		ーナイ						
	9											243															
	>											hbx															
	7																	6,47			368						
			_									(22							-								
	Blank Action Limit							8.9oc1	<u> </u>		:	430.1		495.0 X		 		128.7	_		351135						
	Maximum ICB/CCB" , (ug/L)	<u> </u>				<u> </u>		1 95/12	[86.02		99.01		<u> </u>		145.94	T	<u> </u>	114.37 35	14 1- 1-					-
	Maximum Ma PB" ICI (ug/L) (┝				<u> </u> 			<u></u>			~		19				49.3			-						
	Maximum Mar PB* (mg/Kg) (t	L	-				<u> </u> 	<u> </u> 	<u> </u>					<u> </u>				4							_		
	Analyte Ma	¥	Sp	As	Ba	Ba	8	ő	 	පි	õ	e e	9.	Mg	٤	무	į	\ 	eS eS	Ag	- S	F		, Z		₽	<u> </u> ,

194140 SDG #:

VALIDATION FINDINGS WORKSHEET ICP Serial Dilution

Page: 2nd Reviewer: Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

| N N/A | N/A | If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
| Vol. N/A | Were ICP serial dilution percent differences (%D) <10%?
| Is there evidence of regative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Z ≻	Y N (V/A) Were recalcu	Were recalculated results acceptable?	_ ⊪	Level IV Recalculat	See Level IV Recalculation Worksheet for recalculations.	
*	Diluted Sample ID	Matrk	Analyte	Q%	Associated Samples	Qualifications
=	7	Alo.	<u> </u>	16.3	Ari	The 14
_						
1						
<u> </u>						
L						
<u> </u>						
<u> </u>						
<u> </u>		:	i			-
ة ا						
5	Comments:					

LDC #: 04484 SDG #: 03-2800

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	_of	<u></u>
Reviewer:_	MI	
2nd reviewer:	1	
_	$-\pi$	

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

(Y)	N	N/A
∖▼	N	N/A

Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentration (w//)			•	
Analyte .		6	RPD (Limits)	Difference (Limits)	Qualifications
Aluminum					<u> </u>
Antimony				<u>.</u>	<u> </u>
Arsenic					<u> </u>
Barium				<u> </u>	<u> </u>
Beryllium			<u></u>		<u> </u>
Cadmium			<u> </u>	<u> </u>	<u></u>
Calcium	24500	24500	0		
Chromium		<u> </u>		 	<u> </u>
Cobalt			<u> </u>		
Соррег			 	- 	
iron	23/	243	5		
Lead			 		
Magnesium	11900	11800	 		
Manganese	<u> </u>		 	-	
Mercury	<u> </u>	 			
Nickel	<u></u>			_ 	
Potassium	1930	1920		- 	
Selenium	<u> </u>	ļ			
Silver		 		 	
Sodium	37500	37000	 	- 	
Thellium	ļ <u> </u>	 	 		
Vanadium	<u> </u>	 			
Zinc		 		+	
Cyanide		 			
Boron		 	 	- 	
Molybdenum			 -	_	
Strontium			<u> </u>		
Silicon		1			<u> </u>

Notes:	
1401001	
	

LDC #:	041484
SDG #:	03-2809

VALIDATION FINDINGS WORKSHEET Field Blanks

1414

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

N N/A	Were field blanks identified in this SDG?
Y N N/A Y N N/A	Were target analytes detected in the field blanks?
7	

Sample: _____ Field Blank / Trip Blank / Rinsate / Other ZB (circle one)

Analyte	Concentration Units (4/9)
K	80.7
No	398
	<u> </u>
	<u> </u>
	<u>.l</u>

Sample: ______ S Field Blank / Trip Blank / Rinsate / Other _____ (circle one)

Analyte	Concentration Units (4.9.1.1)
K	66.7
Na	34)
	

Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:

NASA JPL

Collection Date:

April 22, 2003

LDC Report Date:

June 17, 2003

Matrix:

Water

Parameters:

Metals

Validation Level:

EPA Level III

Laboratory:

Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2819

Sample Identification

EB-3-4/22/03

MW-19-1

MW-19-2

MW-19-3

MW-19-4

MW-19-5

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
4/23/03	GCV (14:17)	Arsenic	110.2 (90-110)	EB-3-4/22/03 MW-19-1 MW-19-2	J (all detects)	P
4/23/03	CCV (15:33)	Arsenic	110.2 (90-110)	MW-19-3 MW-19-4 MW-19-5	J (all detects)	Р

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium	118 ug/L	All samples in SDG 03-2819
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	201.41 ug/L 29.33 ug/L 79.39 ug/L 28.08 ug/L 270.76 ug/L	All samples in SDG 03-2819

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-3-4/22/03	Calcium Iron Magnesium Potassium Sodium	204 ug/L 53.1 ug/L 24.7 ug/L 46.6 ug/L 446 ug/L	204U ug/L 53.1U ug/L 24.7U ug/L 46.6U ug/L 446U ug/L
MW-19-4	Iron	105 ug/L	105U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

XIV. Field Blanks

Sample EB-3-4/22/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-3-4/22/03	Calcium Iron Magnesium Potassium Sodium	204 53.1 24.7 46.6 446

NASA JPL Metals - Data Qualification Summary - SDG 03-2819

SDG	Sample	Analyte	Flag	A or P	Reason
03-2819	EB-3-4/22/03 MW-19-1 MW-19-2 MW-19-3 MW-19-4 MW-19-5	Arsenic	J (all detects)	Р	Calibration verification (%R)

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 03-2819

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2819	EB-3-4/22/03	Calcium Iron Magnesium Potassium Sodium	204U ug/L 53.1U ug/L 24.7U ug/L 46.6U ug/L 446U ug/L	А
03-2819	MW-19-4	Iron	105U ug/L	А

Applied P & Ch Laboratory

Metal Analysis Results

Client Name: GEOFON, Inc.

JPLProject ID:

Project No: 04-4428.10

Service ID: 32819 Lab Sample ID: 03-2819-1 Collected by:

Collection Date: 04/22/2003

Received Date: 04/22/2003

Sample Matrix Water

Moisture %:

Sample ID:

Q Qualifier:

Sample Type: Field Sample

EB-3-4/22/03

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	204 📈		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	53.1		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g/L}}$	100	24.7	В	P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	46.6	В	P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	446 🗸	В	P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

U - Not Detected or less than IDL C Qualifier:

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control M Qualifier:

F - GFAA P - ICP A - FLAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No:

04-4428.10

Collection Date: 04/22/2003

Service ID: 32819

Lab Sample ID: 03-2819-2

Collected by:

Received Date: 04/22/2003

Sample ID:

MW-19-1

Sample Type: Field Sample

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	33500		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g}/\mathrm{L}$	50	2500		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$\mu g/L$	100	10400		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g/L}}$	400	2190		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g}/\mathrm{L}$	2000	11800		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

P - ICP M Qualifier:

A - FLAA F - GFAA

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No:

04-4428.10

Collection Date: 04/22/2003

Service ID:

32819

Collected by:

Received Date: 04/22/2003

Sample ID: Sample Type: Field Sample

MW-19-2

Lab Sample ID: 03-2819-3

Sample Matrix Water

Moisture %:

	-											
Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F	-	03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$\mu { m g}/{ m L}$	200	112000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89 - 6	$_{\mu}{ m g}/{ m L}$	50	3150		Р		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu exttt{g}}/ exttt{L}$	100	37900		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	2820		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	28500		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier: U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

P - ICP M Qualifier:

A - FLAA

F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No: Service ID:

04-4428.10

Collection Date: 04/22/2003

Collected by: 32819

Received Date: 04/22/2003 Lab Sample ID: 03-2819-4

Sample Matrix Water Moisture %:

MW-19-3 Sample ID: Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	106000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	236		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$\mu g/L$	100	35000		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	μg/L	400	3020		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	μg/L	2000	29700		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

N - Spike recovery out of control Q Qualifier:

* - Duplicate analysis out of control E - Serial dilution difference out of control

W - Post digestion spike for GFAA out of control

P - ICP M Qualifier:

A - FLAA

F - GFAA

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No: Service ID:

04-4428.10

32819

Collection Date: 04/22/2003

Collected by:

Received Date: 04/22/2003

Sample ID:

MW-19-4

Lab Sample ID: 03-2819-5

Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	34000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	105 U		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	17500		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	2060		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g}/\mathrm{L}$	2000	20800		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control W - Post digestion spike for GFAA out of control * - Duplicate analysis out of control

E - Serial dilution difference out of control

M Qualifier:

A - FLAA

F - GFAA

Client Name:

GEOFON, Inc.

Project No:

04-4428.10

Collection Date: 04/22/2003

Project ID:

JPL

Service ID: 32819 Collected by:

Sample ID:

Lab Sample ID: 03-2819-6

Received Date: 04/22/2003

Sample Type: Field Sample

MW-19-5

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	44800		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}$ g/L	50	616		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g}}/\mathrm{L}$	100	27700		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	2770		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}{ m g}/{ m L}$	2000	30100		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

A - FLAA M Qualifier: P - ICP

F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

SDG Labor	#: 10414D4 #: 03-2819 ratory: Applied P & Ch La	borat	<u>ory</u> 0.7 & 200.9)	1	Level I	11	ESS WORKSHE		Fin al	Date: <u>6/6/</u> Page: <u>1</u> of / Reviewer: 144 2nd Reviewer: 6	
	amples listed below were tion findings worksheets.			JI OI LIIE I		y ve	illuation areas. Vali		IIIG	ings are noted in attached	
<u> </u>	Validation	Area					Co	ommen	ts	<u> </u>	
<u>l.</u>	Technical holding times			À	Samplin	g da	ates: 4/22/03				
n.	Calibration			SW			•				
111.	Blanks			gw							
IV.	ICP Interference Check San	nple (l	CS) Analysis	A							
<u>V.</u>	Matrix Spike Analysis			A	7 m	5/	MSD/Dup for 1	75 fr	ردم	_ 504 03-2809	
VI.	Duplicate Sample Analysis			P)	,	<i>,</i> , , , , , , , , , , , , , , , , , ,	1			
VII.	Laboratory Control Samples	A	Les/	LC	5 D						
VIII.	Internal Standard (ICP-MS)			N	μń	 -	Milized				
IX.	Furnace Atomic Absorption	QC		_A_	fus	A	was not p	serfon	<u>~~</u>	el	
<u>X.</u>	ICP Serial Dilution			N	Not beguned						
XI.	Sample Result Verification			N			<i>v</i>				
XII.	Overall Assessment of Data	ı <u>. </u>		A							
XIII.	Field Duplicates			<u> </u>							
XIV.	Field Blanks			5W	E18	2	<u> </u>				
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet	;	R = Rins	o compound sate eld blank	s detecte	d	D = Duplicate TB = Trip blank EB = Equipmen				
Validat	ed Samples:										
1	EB-3-4/22/03	11			21			31	_[
2	MW-19-1	12			22	<u>.</u>		32			
3	MW-19-2	13			23	3		33			
4	MW-19-3	14			24	<u>. </u>	<u></u>	34			
5	MW-19-4	15			25	5_		35			
6	MW-19-5	16			26	5		36			
7	ÞB	17			27	,		37	.		

Notes:		

LDC #:<u>[041404</u> SDG #:<u>03</u>—2819

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:_	of
Reviewer:	1410
2nd reviewer:	

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
,	AD.	Al, Sb, As Ba, Be, Cd, Cg, Cr, Co, Cu, Fe, Pb, Mg Mn, Hg, Ni, K Se, Ag, Na Ti, V, Zn, Mo, B, Si, CN,
1-6	1800.	
<u> </u>		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
<u> </u>		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN',
-	_	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	:	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	<u> </u>	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
•		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Analysis Method
СР		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
CP Trace		Al, Sb, As, Ba, Be, Cd, 🕝 Cr, Co, Cu, Fe Pb, Mg Mn, Hg, Ni, K, Se, Ag, Na Ti, V, Zn, Mo, B, Si, CN`,
CP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
SFAA		AI, Sb, As)Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',

Comments:	Mercury by CVAA if performed		
			

194/401

VALIDATION FINDINGS WORKSHEET Callbration

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". (Y)N N/A

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?

Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)? Y/ (I) N/A

LEVEL IV ONLY:

Was a midrange cyanide standard distilled?

Y N N/A

Are all correlation coefficients ≥0.895? Were recalculated results acceptable? See Level IV Initlal and Continuing Calibration Recalculation Worksheet for recalculations.

Qualification of Data	◆ なり	9 77 1									
Associated Samples	{}	9-17									
%R	(011-06) 2.011	(0) (40-112)									
Analyte	\$, ¥	- 							:	
Calibration ID	av (1419)	(1833)									
# Date	14/23/03	2 4/23/02	,								

Comments:

LDC #: |o4|4pt| SDG #: 02-78[0] METHOD: Trace Metals (EPA S/N 846 Method 6010/7000) Sample Concentration units, unless otherwise noted:

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied:

(of /	***
Page:	Reviewer:
	2nd F

Ī		ΑI	Sb	As	Ba	8	8	ន	ŏ	8	5	6	윤	Mg	Mn	£	Z	×	8	Ag	g	F	۸	ΓZ	В	Mo	ò
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	_						<u> </u>	2	<u> </u>			Ľ	<u> </u>	7,4				4			44	<u></u>					
	Blank Action							10010				146.60		396.98				140.4			1253.8						
	Maximum ICB/CCB'	7/87						101.4				29.33		94.99				28.08			240,76						
	Maximum PB*	7/5						۵	9																		
		TN JSW																									
	Analyte		£ 6	20 8	2 8	8 8	3 2	3 5	٥	6	ةً أ	3 4	2 8	ğ	Ş	무	Z	¥	ů,	Q Q	2 2	F		Ž		ω	'n

were qualified as not detected, "U".

Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #:	1041404
SDG #:	03-2819

VALIDATION FINDINGS WORKSHEET Field Blanks

1
un

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Y N N/A Y N N/A	Were field blanks ider Were target analytes	ntified in this SDG? detected in the field blanks?		
Sample:		Field Blank / Trip Blank / Rinsate / Other	Z-B	_(circle one)

Analyte	Concentration Units (प् 4/2)
Ca	204
Fe	£3.]
Ма	24.7
	46-6
Na	446

Sample: _____ Field Blank / Trip Blank / Rinsate / Other____ (circle one)

Analyte	Concentration Units ()
<u> </u>	
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,	
	<u> </u>

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 23, 2003

LDC Report Date: June 17, 2003

Matrix: Water

Parameters: Metals

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2843

Sample Identification

DUPE-2-2Q03

EB-4-4/23/03

MW-14-1

MW-14-2

MW-14-3

MW-14-4

MW-14-5

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium	118 ug/L	All samples in SDG 03-2843
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	201.41 ug/L 29.33 ug/L 79.39 ug/L 28.08 ug/L 270.76 ug/L	All samples in SDG 03-2843

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
DUPE-2-2Q03	Iron	19.2 ug/L	19.2V ug/L
EB-4-4/23/03	Calcium Iron Magnesium Potassium Sodium	98.0 ug/L 1.9 ug/L 15.1 ug/L 27.8 ug/L 430 ug/L	98.0U ug/L 1.9U ug/L 15.1U ug/L 27.8U ug/L 430U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-14-1	Iron	32.4 ug/L	32.4U ug/L
MW-14-2	Iron	5,3 ug/L	5.3U ug/L
MW-14-3	Iron	16,0 ug/L	16.0U ug/L
MW-14-4	lron	21.2 ug/L	21.2U ug/L
MW-14-5	Iron	55.7 ug/L	55.7U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

Samples DUPE-2-2Q03 and MW-14-3 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentra		
Analyte	DUPE-2-2Q03	RPD	
Calcium	96500	97600	1
Iron	19.2	16.0	18
Magnesium	39800	41500	4
Potassium	3630	3610	1
Sodium	36600	38100	4

XIV. Field Blanks

Sample EB-4-4/23/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-4-4/23/03	Calcium Iron Magnesium Potassium Sodium	98.0 1.9 15.1 27.8 430

NASA JPL Metals - Data Qualification Summary - SDG 03-2843

No Sample Data Qualified in this SDG

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 03-2843

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2843	DUPE-2-2Q03	Iron	19.2U ug/L	A
03-2843	EB-4-4/23/03	Calcium Iron Magnesium Potassium Sodium	98.0U ug/L 1.9U ug/L 15.1U ug/L 27.8U ug/L 430U ug/L	А
03-2843	MW-14-1	Iron	32.4U ug/L	Α
03-2843	MW-14-2	Iron	5,3U ug/L	A
03-2843	MW-14-3	Iron	16.0U ug/L	A
03-2843	MW-14-4	Iron	21.2U ug/L	А
03-2843	MW-14-5	Iron	55.7U ug/L	A

Client Name: GEOFON, Inc.

Project ID: JPL Project No: 04-4428.10

Sample Matrix Water

32843

Collection Date: 04/23/2003

Collected by: Leo Williamson

04/23/2003

Service ID:

Lab Sample ID: 03-2843-1

Received Date:

Moisture %:

Sample ID:

DUPE-2-2Q03

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	$\mu { m g/L}$	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	96500		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	19.2 📙	В	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	39800		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	3630		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	36600		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA F - GFAA

Client Name:

GEOFON, Inc.

Project ID:

JPL

EB-4-4/23/03

Project No: Service ID:

04-4428.10

32843

Collection Date: 04/23/2003

Collected by: Received Date: Leo Williamson 04/23/2003

Lab Sample ID: 03-2843-2

Sample Matrix Water

Moisture %:

Sample ID: Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}$ g/L	200	98.0 V	В	P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}{ m g}/{ m L}$	50	1.9	В	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}{ m g}/{ m L}$	100	15.1	В	P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09- 7	$_{\mu \mathrm{g/L}}$	400	27.8	В	P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}{ m g}/{ m L}$	2000	430 J	В	P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

M Qualifier: P - ICP

Q Qualifier:

A - FLAA

F - GFAA

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Client Name:

GEOFON, Inc.

JPL

Project No:

04-4428.10

Collection Date: 04/23/2003

32843

Collected by:

Leo Williamson

Project ID:

Service ID:

Lab Sample ID: 03-2843-3

Received Date: 04/23/2003

Sample ID:

MW-14-1

Sample Type: Field Sample

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	$_{\mu \mathrm{g}/\mathrm{L}}$	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	142000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	32.4	В	Р		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g/L}}$	100	45000		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	3130		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$\mu \mathrm{g/L}$	2000	36200		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

P - ICP M Qualifier:

A - FLAA F - GFAA B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

* - Duplicate analysis out of control

E - Serial dilution difference out of control

Applied P & Ch Laboratory

Metal Analysis Results

Client Name: GEOFON, Inc.

Sample Type: Field Sample

Project ID: JPL Project No:

04-4428.10

Collection Date: 04/23/2003

Service ID:

32843

Collected by: Received Date:

Leo Williamson 04/23/2003

Lab Sample ID: 03-2843-4

Sample ID:

MW-14-2

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	128000		Р		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	5.3 U	В	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g}}/\mathrm{L}$	100	42700		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	2920		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	29900		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

Client Name:

GEOFON, Inc.

Project ID:

 $_{
m JPL}$

Project No:

04-4428.10

Collection Date: 04/23/2003

Service ID: Lab Sample ID: 03-2843-5

32843

Collected by: Received Date: Leo Williamson 04/23/2003

Sample ID:

MW-14-3

Sample Type: Field Sample

Sample Matrix

Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	υ	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g}}/\mathrm{L}$	200	97600		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$\mu \mathrm{g/L}$	50	16.0 K	В	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g}}/\mathrm{L}$	100	41500		Р		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g/L}}$	400	3610		P		03M13 7 4L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	38100		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

C Qualifier: Q Qualifier:

M Qualifier:

U - Not Detected or less than IDL N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

F - GFAA A - FLAA

* - Duplicate analysis out of control E - Serial dilution difference out of control

Applied P & Ch Laboratory

Metal Analysis Results

GEOFON, Inc. Client Name:

Project ID: JPL Project No: 04-4428.10

32843

Collection Date: 04/23/2003

Collected by: Leo Williamson 04/23/2003

Sample ID:

Service ID: Lab Sample ID: 03-2843-6 Sample Matrix Water

Received Date: Moisture %:

MW-14-4

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	50300		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	21.2	В	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$\mu \mathrm{g/L}$	100	16900		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$\mu g/L$	400	2230		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	25500		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

U - Not Detected or less than IDL C Qualifier:

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

96/18/07

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No: Service ID:

04-4428.10

32843

Collection Date: 04/23/2003

Collected by:

Lab Sample ID: 03-2843-7

Received Date:

Leo Williamson 04/23/2003

Sample ID:

MW-14-5

Sample Matrix Water Moisture %:

Sample Type:	Field Sample

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	17100		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	55.7 V	_	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g}}/\mathrm{L}$	100	10800		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}{ m g}/{ m L}$	400	2150		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	28200		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier:

P - ICP

A - FLAA

F - GFAA

SDG Labo	DC #: 10414E4 VALIDATION COMPLETENESS WORKSHEET SDG #: 03-2843 Level III Page: of Page: of Reviewer: METHOD: Metals (EPA Method 200.7 & 200.9)								
	samples listed below were ation findings worksheets		ewed for ead	ch of the fo	ollowing	valid	lation areas. Validati	on fin	idings are noted in attached
	<u>Validation</u>	Area	<u> </u>				Comr	nents	<u></u>
ı.	Technical holding times			A	Sampling	date	s: 4/23103		
II.	Calibration			A					
111.	Blanks			SU					
IV.	ICP Interference Check Sar	nple (l	CS) Analysis	K					
_V.	Matrix Spike Analysis			Á	\ h	<u> </u>	150/ Dup for	ا لح	from 5 1/9 03-2933
VI.	Duplicate Sample Analysis			A	,	<u>/</u>	<i>J</i> ' ' '	· 1	,
VII.	Laboratory Control Samples	(LCS)	A	Les/Les D				
VIII.	Internal Standard (ICP-MS)			N	Nit	U	tilized		
IX.	Furnace Atomic Absorption	QC		A	Jus,	1 1	was put put	in	ಲ
Χ.	ICP Serial Dilution			N	Vit beguned				
XI.	Sample Result Verification			N					
XII.	Overall Assessment of Data	1		A.					
XIII.	Field Duplicates			5W	(1,5)				
XIV.	Field Blanks			3W	EB = 2				
Note:	e: A = Acceptable ND = No corr N = Not provided/applicable R = Rinsate SW = See worksheet FB = Field bla			sate	s detected		D = Duplicate TB = Trip blank EB = Equipment bla	nk	
Validat	ted Samples:								
1	DUPE-2-2Q03	11			21			31	
2	EB-4-4/23/03	12			22	\perp		32	
3	MW-14-1	13	<u> </u>		23	ot		33	
4	MW-14-2	14	<u> </u>		24	$oldsymbol{\perp}$		34	
5	MVV-14-3	15	ļ		25			35	
6	MW-1 <u>4-4</u>	16			26	$oldsymbol{\perp}$		36	
7	M\V-14-5	17			27	丄		37	

Notes:				

LDC #:<u>|041454</u> SDG #:<u>|03-284</u>2

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:_	of
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All circled elements are applicable to each sample.

		The state of the s
Sample ID	<u> Matrix</u>	Target Analyte List (TAL)
1-7	Da-	Al, Sb, 🖎 Ba, Be, Cd, Cg, Cr, Co, Cu, Fe, Pb, (fg) Mn, Hg, Ni, K Se, Ag, (va) Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	_	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN ⁻ ,
		Analysis Method
СР		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
CP Trace		Al, Sb, As, Ba, Be, Cd,Ce) Cr, Co, Cu,Fe Pb, Mg Mn, Hg, Ni,K,Se, Ag,(Na) Ti, V, Zn, Mo, B, Si, CN ⁻ ,
CP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
SFAA		Al, Sb, (As) Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,

Comments: Mercury by CVAA if performed

SDG #: 03-124/3 МЕТНОD: Trace Metals (EPA SW 846 Method 6010/7000) 100 # 104/4E4

Sample Concentration units, unless otherwise noted:

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Reviewer:

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Associated Samples: Soil preparation factor applied:

4

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IDC#:	10414 E4
SDG #:_	03-2843

VALIDATION FINDINGS WORKSHEET Field Duplicates

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MU	
	_
	l of Mu

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Y N N/A Y N N/A Were field duplicate pairs identified in this SDG?
Were target analytes detected in the field duplicate pairs?

	Concentration ()]	· [
Analyte		5	RPD (Limits)	Difference (Limits)	Qualifications
Aluminum			<u> </u>		
Antimony					
Arsenic					
Barium			·	· · · · · · · · · · · · · · · · · · ·	
Beryllium				<u> </u>	<u></u> .
Cadmium					
Calcium	96500	97600		<u> </u>	
Chromium		\ 			·
Cobalt			<u> </u>	_	-
Copper			 		
iron	19,2	16.0	18	_	
Lead			<u></u>	_	· · · · · · · · · · · · · · · · · · ·
Magnesium	39800	41500	4	 	
Manganese	<u></u>				· <u>-</u>
Mercury	<u> </u>	<u> </u>		 	
Nickel		<u> </u>	 		
Potassium	3630	3610			
Selenium					
Silver	<u> </u>	<u> </u>			
Sodium	36600	38100	4		
Thellium		 		_	
Vanadium	<u> </u>				
Zinc	<u> </u>	 			
Cyanide			 		
Boron		<u> </u>	 		
Molybdenum		 	 		<u>.</u> . <u> </u>
Strontium			<u> </u>		
Silicon			<u> </u>		<u> </u>

Notes:	

LDC #:_	10414 E4
SDG #:	03-2843

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:_	of
Reviewer:	14,44
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· ·						.77
HOD: Tr	ace Metals (EPA	SW 846 Method 6010/7000)				V
N/A N/A	Were field blan	ks identified in this SDG? alytes detected in the field blanks?				
		Field Blank / Trip Blank / Rir	nsate //Otber	EB	(circle one)	
						_
		Analyte			Concentration Units ()	
			Ca		98.0	
	·		FR		1.9	
	 		Mg		15-1	,
		· · · · · · · · · · · · · · · · · · ·	<u>K</u>		27.8	
			la	<u> </u>	430	
	<u> </u>					
			<u> </u>			
						_
ole:		Field Blank / Trip Blank / Rin	nsate / Other		<u> </u>	
ole:			nsate / Other_		(circle one) Concentration Units ()	
ole:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
ile:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
ole:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
ole:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
ile:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
lle:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
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ole:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
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ole:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	
ole:		Field Blank / Trip Blank / Rin	nsate / Other		Concentration	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

April 24, 2003

LDC Report Date:

June 17, 2003

Matrix:

Water

Parameters:

Metals

Validation Level:

EPA Level III

Laboratory:

Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2866

Sample Identification

DUPE-3-2Q03

EB-5-4/24/03

MW-20-1

MW-20-2

MW-20-3

MW-20-4

MW-20-5

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples			
PB (prep blank)	Potassium Sodium	66.4 ug/L 525 ug/L	All samples in SDG 03-2866			
ICB/CCB	Iron Magnesium Potassium Sodium	2.29 ug/L 24.40 ug/L 79.72 ug/L 1295.55 ug/L	All samples in SDG 03-2866			

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-5-4/24/03	Potassium	106 ug/L	106U ug/L
	Sodium	962 ug/L	962U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

Samples DUPE-3-2Q03 and MW-20-1 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentra		
Analyte	DUPE-3-2Q03	MW-20-1	RPD
Calcium	51400	52100	1

	Concentral		
Analyte	DUPE-3-2Q03	MW-20-1	RPD
Iron	49.4	56.3	13
Magnesium	15700	16100	3
Potassium	2310	2380	3
Sodium	15100	15800	5

XIV. Field Blanks

Sample EB-5-4/24/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-5-4/24/03	Iron Potassium Sodium	26.0 106 962

NASA JPL Metals - Data Qualification Summary - SDG 03-2866

No Sample Data Qualified in this SDG

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 03-2866

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2866	EB-5-4/24/03	Potassium Sodium	106U ug/L 962U ug/L	А

Applied P & Ch Laboratory

Metal Analysis Results

Client Name: GEOFON, Inc.

Project ID: JPL Project No: 04-4428.10 Service ID:

32866

Collection Date: 04/24/2003 Leo Williamson Collected by:

Received Date: 04/24/2003

Sample ID:

DUPE-3-2Q03

Lab Sample ID: 03-2866-1 Sample Matrix Water

Moisture %:

Sample Type: Field Sample

												
Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	51400		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	49.4	В	P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu { m g}}/{ m L}$	100	15700		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	2310		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu \mathrm{g/L}}$	2000	15100		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

P - ICP M Qualifier:

A - FLAA

F - GFAA

CV - Cold Vapor

16/18/00

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No: Service ID:

04-4428.10

Collection Date: 04/24/2003

Collected by: Leo Williamson

Lab Sample ID: 03-2866-2

32866

Received Date:

04/24/2003

Sample ID:

EB-5-4/24/03

Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	υ	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	< 200	U	P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g/L}}$	50	26.0	В	P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	< 100	U	P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g/L}}$	400	106 U	В	P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	962 LA	В	P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

M Qualifier:

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: Q Qualifier:

U - Not Detected or less than IDL

N - Spike recovery out of control

B - Less than RL (PQL, EQL or CRDL), but greater than IDL. * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

P - ICP

F - GFAA A - FLAA

E - Serial dilution difference out of control CV - Cold Vapor

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Applied P & Ch Laboratory

Metal Analysis Results

Client Name: GEOFON, Inc.

Project ID: JPL Project No: 04-4428.10

32866 Service ID:

Collection Date: 04/24/2003 Leo Williamson Collected by:

Lab Sample ID: 03-2866-3

Sample Matrix Water

Received Date: 04/24/2003

Moisture %:

Sample ID:

MW-20-1

Sample	Type:	Field	Sample

Element Name	CAS No	Unit	RL	Result	С	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F	·	03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$\mu g/L$	200	52100		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g}}/\mathrm{L}$	50	56.3		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	16100		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g/L}}$	400	2380		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu\mathrm{g}/\mathrm{L}}$	2000	15800		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

Client Name: GEOFON, Inc.

JPL Project ID:

Project No: 04-4428.10

Service ID: 32866 Collected by:

Collection Date: 04/24/2003 Leo Williamson

Lab Sample ID: 03-2866-4

Received Date: 04/24/2003

Sample ID: Sample Type: Field Sample

MW-20-2

Sample Matrix Water

Moisture %:

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	39400		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	65.8		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	13100		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g/L}}$	400	1780		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	13000		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier:

U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier:

N - Spike recovery out of control

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier:

P - ICP

A - FLAA

F - GFAA

Client Name: GEOFON, Inc.

Project ID: JPL Project No:

04-4428.10

Collection Date: 04/24/2003

32866 Service ID:

Collected by:

Leo Williamson

Sample ID:

Lab Sample ID: 03-2866-5

Received Date:

04/24/2003

Sample Type: Field Sample

MW-20-3

Sample Matrix Water

Moisture %

Moistare	70:	_

Element Name	CAS No	Unit	RL	Result	C	М	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$\mu g/L$	200	36900		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$\mu \mathrm{g}/\mathrm{L}$	50	30.2	В	P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu \mathrm{g/L}}$	100	12800		Р		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu}\mathrm{g/L}$	400	2340		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu \mathrm{g}}/\mathrm{L}$	2000	54200		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

U - Not Detected or less than IDL C Qualifier:

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

N - Spike recovery out of control Q Qualifier:

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

P - ICP M Qualifier:

A - FLAA

F - GFAA

Applied P & Ch Laboratory

Metal Analysis Results

Client Name: GEOFON, Inc.

Project ID: JPL Project No: 04-4428.10

Service ID: 32866 Collection Date: 04/24/2003 Collected by: Leo Williamson

Received Date: 04/24/2003

Sample ID:

MW-20-4

Lab Sample ID: 03-2866-6 Sample Matrix Water

Moisture %:

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu}\mathrm{g/L}$	200	10300		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$_{\mu}\mathrm{g/L}$	50	673		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	2700		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$_{\mu \mathrm{g}}/\mathrm{L}$	400	1110		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	54300		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

N - Spike recovery out of control Q Qualifier:

W - Post digestion spike for GFAA out of control

* - Duplicate analysis out of control E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

16/18/10

Client Name:

GEOFON, Inc.

Project ID:

JPL

Project No: Service ID:

04-4428.10

Collection Date: 04/24/2003

Collected by:

Leo Williamson

04/24/2003

Lab Sample ID: 03-2866-7 Sample Matrix Water

32866

Received Date:

Moisture %:

Sample ID:

MW-20-5

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	С	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	μg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	$_{\mu \mathrm{g/L}}$	200	4840		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	$_{\mu \mathrm{g/L}}$	50	50.6		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	$_{\mu}\mathrm{g/L}$	100	1020		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	$\mu \mathrm{g/L}$	400	1580		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	$_{\mu}\mathrm{g/L}$	2000	64400		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

Q Qualifier:

C Qualifier: U - Not Detected or less than IDL

N - Spike recovery out of control

B - Less than RL (PQL, EQL or CRDL), but greater than IDL. * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

SDG Labo	#: 10414F4 #: 03-2866 ratory: <u>Applied P & Ch L</u> HOD: Metals (EPA Meth	aborat	<u>cory</u>	I	PLETEN Level III		ORKSHEE	Γ	Date: <u>6/16</u> Page: lof l Reviewer: MH 2nd Reviewer:
The s	camples listed below were ation findings worksheets	re revi	ewed for ea	ch of the f	ollowing v	/alidatior	ı areas. Validat	ion find	lings are noted in attached
<u> </u>	<u>Validatior</u>	<u> Area</u>	·				<u>Com</u> ı	nents	
1.	Technical holding times		,.	A	Sampling	dates: 4	1241.3		
11.	Calibration			A					
III.	Blanks			4W					<u></u> .
IV.	ICP Interference Check Sa	ımple (l	CS) Analysis	A	<u> </u>				
V.	Matrix Spike Analysis			A	, hs	/ms)/	pup for A	to	~ 404 03-2933
VI.	Duplicate Sample Analysis			A	5	, , , , , , , , , , , , , , , , , , ,	• •	'	,
VII.	Laboratory Control Sample	s (LCS))	A	LUS	LCSD			
VIII.	Internal Standard (ICP-MS)		N	lut'	utili	ها		
IX.	Furnace Atomic Absorption	ı QC		A	MA	hone	not perf	ouk	1
<u>X.</u>	ICP Serial Dilution			N.	Nit	rea	wies!		
XI.	Sample Result Verification			N		f 			
XII.	Overall Assessment of Dat	а		A					
XIII.	Field Duplicates			3W	C1,	37			
XIV.	Field Blanks			5W	5B=	2	-	_	
Note: √alidat	A = Acceptable N = Not provided/applicabl SW = See worksheet ed Samples:	e	R = Rin	o compounds sate eld blank	s detected	T	= Duplicate B = Trip blank B = Equipment bla	nk	
1	DUPE-3-2Q03	11		 -	21	1	<u> </u>	31	
2	EB-5-4/24/03	12			22			32	
3	MW-20-1	13		-	23		•-	33	
4	MW-20-2	14			24			34	
5	MW-20-3	15			25			35	
6	MW-20-4	16			26			36	
	MW-20-5	17			27			37	
8	γB	18			28			38	

Notes:		 	
	 -	 	

LDC #: <u>10414</u> F4 SDG #: <u>03-281</u>6

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: of / Reviewer: Mb 2nd reviewer:

All circled elements are applicable to each sample.

Matrix	Target Analyte List (TAL)
	Al, Sb, (As) Ba, Be, Cd, (Cg) Cr, Co, Cu, (Fe) Pb, (Mg) Mn, Hg, Ni, (K) Se, Ag, (Qa) Tl, V, Zn, Mo, B, Si, CN',
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
·	
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
,	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
- 	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
<u>. · . </u>	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb. As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Π, V, Zn, Mo, B, Si, CN',
	Analysis Method
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe Pb, Mg Mn, Hg, Ni, K, Se, Ag, Na Tl, V, Zn, Mo, B, Si, CN`,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
/	Al, Sb, (As) Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN
	AD

Comments: Mercury by CVAA if performed

Reviewer: _____ Page: Z SDG #: 03-286 P

NETHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied:
Sample Concentration units, unless otherwise noted:

NALIDATION FINDINGS WORKSHEET

PB/ICB/CCB GUALIFIED SAMPLES

RETHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied:

Sample Concentration units, unless otherwise noted: 10414 Fut

		A	හි	As	8	&	8	ပ	ö	8	Б	FB	P.	Mg	Ā	£	Z	¥	8	Ag	ž	F	>	Zn	В	Mo	ď
							į																				
					-																		-				
																											
					_				_						-												
difloation		_ -																									
Sample Identification											_					,											
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																1		İ									
					_																						
	7																	901			495						
	Blank Action Limit											11.45		7				348.6			149095						
	Maximum ICB/CCB (ug/L)							_			T	2,28	-	24,40				19.72			ころと、これにものって						
	Maxlmum PB" (ug/L)																	7,49	t		7						
	Maximum PB* (mg/Kg)																1										
	Analyte	₹	gs	As	8	BB	3	Ö	ن ا	ځ] [3]	3	<u> </u>	ě	, P	모	ž	×	e,	Ag	e Z	F	>	Z	l _m	£	δ

Samples with analyte concentrations within live interview associated to the consolination as a second associated with which are the firsted analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element. Note:

LDC #:	10414	F4_
SDG #:	03-	2866

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	1 of 1
Reviewer:_	MU
2nd reviewer:_	1

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

$\langle \mathbf{Y} \rangle$	N	N/A
$\langle \mathbf{Y} \rangle$	N	N/A

Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentration	(ugle)	<u> </u>	· [
Ansiyte	1 .	3	RPD (Limits)	Difference (Limits)	Qualifications
Aluminum				-	
Antimony	·	<u> </u>	 		
Arsenic			 		<u> </u>
Barium					
Beryllium			 	_	
Cedmium			 		
Calcium	51400	72/00		- 	
Chromium		 -		 	<u></u>
Cobalt	· 				
Copper		 -	13		
Iron	49.4	6.3	<u> </u>		
Lead					,
Magnesium	15700	16100	<u> </u>		
Manganese	 		 		
Mercury			 		
Nickel		2200	3		
Potassium	2310	2380	 	 	
Selenium					
Silver	 	14.00-	5		
Sodium	15/00	17800	 		<u> </u>
Thellium			 		
Vanadium	<u> </u>	 			
Zinc	<u> </u>		 		
Cyanide	<u> </u>	 			
Boron	<u> </u>	 	 		
Molybdenum				_	
Strontium					
Silicon			<u> </u>	<u> </u>	1

Notes:	

LDC #:	1041474
SDG #:_	03-2866

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:_	<u>/</u> of/
Reviewer:_	1419
2nd reviewer:	A
	A1 -

METHOD: Tr	ace Metals (EPA SW	/ 846 Method 6010/7000)	- N
Y N N/A Y N N/A	Were field blanks	identified in this SDG? rtes detected in the field blanks?	
Sample:		Field Blank / Trip Blank / Rinsate / Other	<pre>(circle one)</pre>
		Analyte	Concentration Units (***)
 		Fe	26.0
 		<u>K</u>	106
			962
Sample:		Field Blank / Trip Blank / Rinsate / Other	(circle one)
		Analyte	Concentration Units ()
			
			
	-		
			
			